Mathematics Instructional Cycle Guide

Rounding Decimals (5.NBT.A.4)

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Connecticut Dream Team teacher

CT CORE STANDARDS

This Instructional Cycle Guide relates to the following *Standards for Mathematical Content* in the *CT Core Standards for Mathematics*:

Understand the place value system.
5.NBT.A.4 Use place value understanding to round decimals to any place.

This Instructional Cycle Guide also relates to the following *Standards for Mathematical Practice* in the *CT Core Standards for Mathematics*:

MP.3 Construct viable arguments and critique the reasoning of others
- Students explain how they used the number line and their understanding of place value, to round a decimal to any place

MP.8 Look for and express regularity in repeated reasoning
- A student may use his/her understanding of where a decimal is placed on a number line, in relation to benchmark numbers. to deduce a rounding rule. (i.e. "If the digit to the right of the place being rounded to is 5 or greater, the decimal is rounded up. If that digit is less than 5, the decimal is rounded down")

WHAT IS INCLUDED IN THIS DOCUMENT?

- A Mathematical Checkpoint to elicit evidence of student understanding and identify student understandings and misunderstandings **(page 2 and 11)**
- A student response guide with examples of student work to support the analysis and interpretation of student work on the Mathematical Checkpoint **(pages 3-6)**
- A follow-up lesson plan designed to use the evidence from the student work and address the student understandings and misunderstandings revealed **(pages 7 - 10)**
- Supporting lesson materials and teacher resources **(pages 12 - 28)**
- Precursory research and review of standard **5.NBT.A.4** and assessment items that illustrate the standard **(pages 29 - 30)**

HOW TO USE THIS DOCUMENT

1) Before the lesson, administer the ***Rounding Decimals Mathematical Checkpoint*** individually to students to elicit evidence of student understanding.
2) Analyze and interpret the student work using the ***Student Response Guide***
3) Use the next steps or ***follow-up lesson plan*** to support planning and implementation of instruction to address student understandings and misunderstandings revealed by the Mathematical Checkpoint
4) Make instructional decisions based on the checks for understanding embedded in the follow-up lesson plan

MATERIALS REQUIRED

- copies of Kid's Menu (see page 12)
- copies of card sets and number lines for "Decimal Card Sort" (see pages 13-14)
- copies of game boards, numeral cards, and recording sheets for "Decimal Rounding Game" (see pages 15-17)
- copies of lesson activities (see pages 18 – 22)

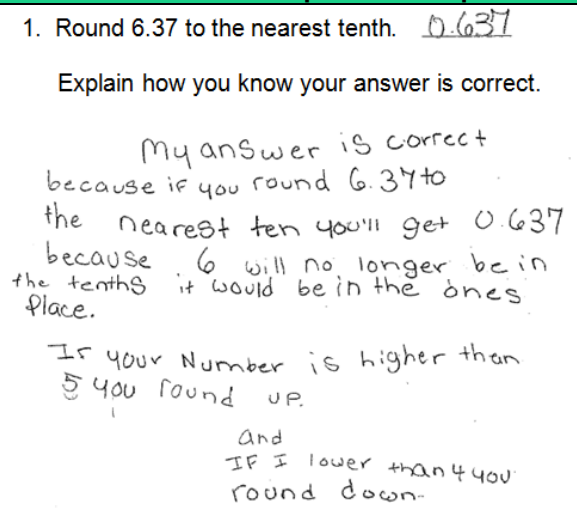
TIME NEEDED

Rounding Decimals Checkpoint administration: **10 minutes**
Follow-Up Lesson Plan: **2 class periods**

Timings are only approximate. Exact timings will depend on the length of the instructional block and needs of the students in the class.

Step 1: Elicit evidence of student understanding		
Mathematical Checkpoint		
Question(s)	**Purpose**	
1. Round 6.37 to the nearest tenth. 2. Explain how you know your answer is correct.	**CT Core Standard:**	*5.NBT.A.4* Use place value understanding to round decimals to any place.
	Target question addressed by this checkpoint:	Can students demonstrate place value understanding to correctly round a decimal to the nearest tenth?

Step 2: Analyze and Interpret Student Work		
Student Response Guide		
Got It	**Developing**	**Getting Started**
1. Round 6.37 to the nearest tenth. 6.4 Explain how you know your answer is correct. 6.4 is the right answer, when it comes to rounding 6.37 to the nearest tenth, because 6.37 is just 3 hundredths away from 6.40, but 7 hundredths away from 6.30.	1. Round 6.37 to the nearest tenth. 6.40 Explain how you know your answer is correct. you would rond 6.37 to 6.40 because its [redacted] hier than 5 and if it is hier than 5 you rond up.	1. Round 6.37 to the nearest tenth. 0.637 Explain how you know your answer is correct. my answer is correct because if you round 6.37 to the nearest ten you'll get 0.637 because 6 will no longer be in the tenths it would be in the ones place. If your Number is higher than 5 you round up. and IF I lower than 4 you round down.

<table>
<tr><th colspan="2">Getting Started</th></tr>
<tr><th>Student Response Example</th><th>Indicators</th></tr>
<tr><td> 
</td><td>• Decimal is rounded incorrectly
• Student may interchange whole number place values with decimal place values (i.e. “tens” and “tenths”)
• Student may physically “shift” the digits in the decimal to a new place resulting in a significantly larger or smaller decimal indicating a lack of place-value understanding
• Student may describe a "rounding rule", but does not apply it correctly</td></tr>
<tr><th>In the Moment Questions/Prompts</th><th>Closing the Loop (Interventions/Extensions)</th></tr>
<tr><td>Q: Tell me about your answer. How do you know you rounded correctly?

Q: Which digit is in the tenths place?

Q: What does "round to the nearest tenth" mean?

Q: How is rounding decimals similar to rounding whole numbers? How can this help us?

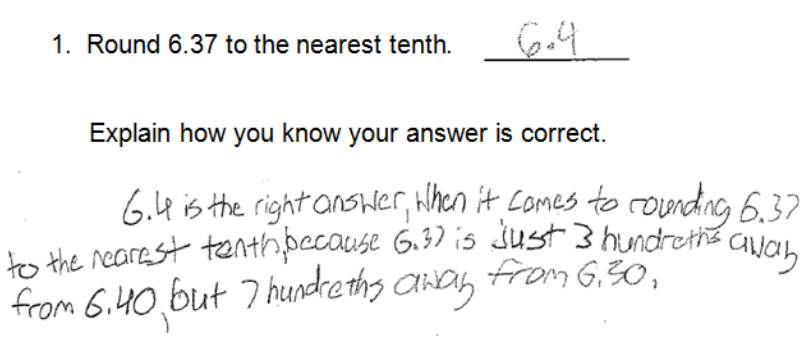
P: Show student a number line and have them identify a decimal that is close to 6.3 and one that is closer to 6.4. If we were to round your decimals to the nearest tenth, would they round down to 6.3 or up to 6.4? Explain your thinking.</td><td>http://learnzillion.com/lessons/3094-represent-decimal-numbers-on-a-number-line

http://learnzillion.com/lessons/3430-round-decimals-to-the-nearest-whole-number

http://learnzillion.com/lessons/3432-round-decimals-to-the-nearest-tenth

Have students round 6.37 to the nearest whole number using a number line model. What do students notice about how the decimal was rounded? Why did the decimal round down to 6? How can we use this knowledge to help us round 6.37 to the nearest tenth?</td></tr>
</table>

Developing	
Student Response Example	**Indicators**
1. Round 6.37 to the nearest tenth. 6.40 Explain how you know your answer is correct. you would rond 6.37 to 6.40 because its [redacted] hier than 5 and if it is hier than 5 you rond up.	• Decimal is rounded incorrectly • The student has misconceptions about rounding involving place value (e.g., when rounding to the nearest tenth, the decimal is actually rounded to the nearest whole number) • Student may use knowledge of equivalent decimals to help him/her round, but doesn't truncate the decimal at the tenths place when finished (i.e. "6.37 rounds to 6.40") • Student explanation may include only a rounding rule with no indication of place-value understanding
In the Moment Questions/Prompts	**Closing the Loop (Interventions/Extensions)**
Q: Tell me about the decimal you wrote. Do you know any way that you could prove that you are correct? **Q:** Can you explain what you mean by "if it is higher than 5, you round up"? Q: How are 6.40 and 6.4 related? What does it mean to round to the nearest tenth? **P:** On a number line, have student show you between what two tenths 6.37 lies. How can we use this information to help us round 6.37 to the nearest tenth?	http://learnzillion.com/lessons/3094-represent-decimal-numbers-on-a-number-line http://learnzillion.com/lessons/3430-round-decimals-to-the-nearest-whole-number http://learnzillion.com/lessons/3432-round-decimals-to-the-nearest-tenth

Got it	
Student Response Example	**Indicators**
	• Decimal is rounded correctly • Student's explanation demonstrates place value understanding by showing or describing the distance from 6.37 to each nearest tenth (i.e. 6.37 is 3 hundredths away from 6.4 and 7 hundredths away from 6.3) • Student's explanation may include the use of a model (e.g., number line, place-value chart or base ten blocks) to demonstrate understanding • If student uses equivalent decimals (i.e. 6.30 and 6.40) to assist with the rounding process, the rounded answer is truncated at the tenths place
In the Moment Questions/Prompts	**Closing the Loop (Interventions/Extensions)**
Q: Can you name a decimal that is **greater** than 6.4 that would also round to 6.4? Q: How did you know to use 6.30 and 6.40 to help you round your decimal? Q: What would you tell a student that chose 6.40 as their final answer to this problem? Q: Can you generalize a "rule" that would always work when rounding decimals or whole numbers? Q: How is the process for rounding decimals and rounding whole numbers similar? How is it different?	http://learnzillion.com/lessons/3322-round-decimals-to-the-nearest-hundredth Show students a decimal with digits in the tenths, hundredths, and thousandths places (i.e. 63.092). Have students round the decimal to the nearest tenth and then the nearest hundredth. How are the answers similar and different? What do you have to consider when rounding a decimal to any place? Can you come up with a context for rounding a decimal to any place?

Steps 3 and 4: Act on Evidence from Student Work and Adjust Instruction	
Lesson Objective:	Round a decimal to the nearest tenth using a number line.
Content Standard(s):	***5.NBT.A.4*** Use place value understanding to round decimals to any place
Targeted Practice Standard :	**MP3 Construct viable arguments and critique the reasoning of others** • Can the student clearly explain how he/she rounded the decimal? **MP8 Look for and express regularity in repeated reasoning** • Student may generate a "rounding rule" from his/her understanding of place value.

Mathematical Goals	Success Criteria
○ Understand that rounding a decimal to the nearest tenth means choosing the benchmark tenth that the decimal is closest to	○ Correctly round a decimal to the nearest tenth ○ Use a number line to show that the decimal was rounded correctly

Launch (Probe and Build Background Knowledge)

Purpose: Create a real world context for rounding decimals by rounding prices on a menu to the nearest dollar

Give students copies of the Kid's Menu (page 12). Discuss the following questions.

- About how much does a meal cost? A drink? Dessert? Explain why you rounded to that dollar amount.
- If you had $11.00, would you have enough money to buy a meal, drink, and dessert? Explain how you know.
- When might it be helpful to round the prices on the menu to the nearest dollar?
- When would it be important to use exact prices on the menu?

Instructional Task

Purpose: Students work in partnerships or small groups to sort decimal cards along a number line. Students discuss what the benchmark numbers should be, and notice patterns about which decimals are rounded to each benchmark number.

Engage (Setting Up the Task) - *Decimal Card Sort*

Cut out the decimal cards (pages 13-14) and give one set of cards to each partnership or small group. Have students set aside these two cards: 1.609 and 1.692

Ask the students to put the cards in order, and write the ordered decimals on the number line.
Note: If your tables/desks are erasable, students could draw the number line with dry erase marker directly above the decimal cards on their table/desk.

Questions:

- Why did you place the decimal _____ where you did?
- Did you use any other decimals as guides to help you place _____?

Next, tell them that they will be using this number line to round to the nearest tenth. Ask them how they would label the end points on the number line. Students may suggest using 1.60 and 1.70. This is fine to help guide them in their use of the number line. It is important that they also use the equivalent decimals, 1.6 and 1.7 as labels in order to help them see to which tenth the decimals will round. This is a misconception that you will want to address with students. When we use

an equivalent decimal (1.60 for 1.6) to help us round, we need to truncate the final answer at the place to which we are rounding, in this case, the nearest tenth. This is why we say that 1.61 rounds to 1.6 and not to 1.60, even though the two decimals are equivalent.

Question:

- How did you know to choose these two end points?
- Would 1.60 and 1.70 also be correct? Explain your reasoning.

Discuss which decimals round to each end point.

Questions:

- How is this similar/different from rounding to the nearest whole number?
- When in real life might you want to round to the nearest whole number? (money, measuring)
  Nearest tenth? (rainfall, dosing medicine)
  Nearest hundredth? (race times for sports)
- How does using a number line help you organize your thinking when you are rounding a decimal?
- What do you notice about the distance from the given decimal to each end point?
- What do you notice about the location of the given decimal in relation to the midpoint of the number line?

Finally, ask them to place the last two decimal cards (1.609 and 1.692) on the number line.

Questions:

- How can you tell where to place the decimals when the number line is not marked in thousandths?
- How would you round these two decimals to the nearest tenth?

If needed, partnerships/small groups could be given Worksheet #1 (page 25) to practice rounding. Have students discuss how they decided on the end points and why they rounded each decimal up or down.

Explore (Solving the Task) - *Decimal Rounding Game*

Cut apart numeral cards (see pages 15-17).
Have students play the game in partnerships.
Observe as students as they play and assist partnerships who need help selecting end points or rounding decimals.

Elaborate (Discuss Task and Related Mathematical Concepts)

Questions/Prompts:

- What patterns do you notice about when decimals round up and they round down?
- Could you use these patterns to generate a "rounding rule"?
- Turn and talk with your partner, then see if you can explain in writing the "rounding rule" you notice. Would your rule always work? Why or why not?

Checking for Understanding

Purpose: Check student understanding of rounding to the nearest tenth by having students round each measure in the "Equal Measures" table (attached).

If students need scaffolding, use the attached resources (pages 23-28): Model for Students - Part 1; Worksheet #1; Model for Students - Part 2; & Worksheet #2. The decimals that are rounded in these activities are the same decimals used in the "Equal Measures" table (see page 18).

• What would be an advantage to using a table with **rounded** measures? (easier to compare measures, easier to memorize, everything would be standardized)
• What would be an advantage to using a table with the **original** measures? (more accurate measurements).

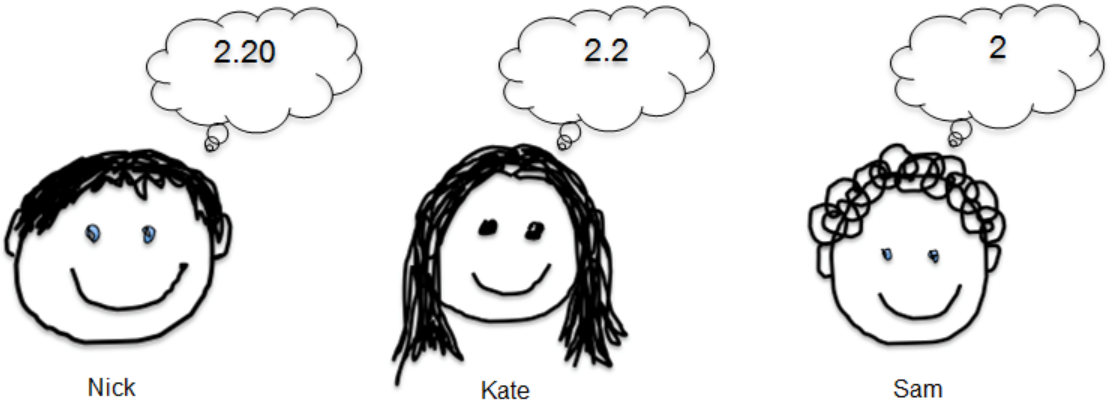
Common Misunderstanding

Purpose: Use an agree/disagree problem where students analyze the thinking of three fictional students related to their decimal rounding answer.

Their teacher asked the class to round 2.17 to the nearest tenth.

Nick thinks the answer is 2.20.
Kate thinks the answer is 2.2.
Sam thinks the answer is 2.

Which student do you agree with?
Explain why the other two students are not correct.



Facilitate a think-write-pair-share to elicit evidence of student reasoning about which student they agree with and why.
Teacher's Notes:

- Kate's answer is correct.
- Nick's answer reveals the common misunderstanding related to decimal equivalence. 2.20 is the same as 2.2. Although the two decimals are equivalent, "six and twenty hundredths" is not correctly rounded to the nearest tenth. The rounded decimal should be truncated at 2.2.
- Sam's answer reveals the common error of rounding to the nearest whole number instead of to the nearest tenth.

Checking for Understanding

Purpose: Pose the following question as an exit card to assess student understanding that a decimal can be rounded to the nearest tenth as well as to the nearest whole number.

Tom's class was collecting weather data. The amount of rainfall at his school in Hartford, CT that month was 3.84 inches. Tom said "That's about 3.8 inches." His friend Katelyn said, "No, that's about 4 inches." Their teacher said that both Tom and Katelyn were correct. Explain how this could be true. Use number lines and words to explain your reasoning.

Questions:

- To what place did Tom round 3.84? (tenths)
- Did he round correctly? (yes)
- To what place did Katelyn round 3.84? (ones)
- Did she round correctly? (yes)

Closure

Purpose: Provide students an opportunity to monitor and reflect on their own understanding of rounding decimals using the following self-assessment.

Think about your learning. Circle the statement you feel best matches your level of success with each item.

I can correctly round a decimal to the nearest tenth.	I can do this with help.	I can do this by myself.	I can do this on my own and explain it to someone else.
When I round a decimal to the nearest tenth, I can use a number line to show why my answer is correct.	I can do this with help.	I can do this by myself.	I can do this on my own and explain it to someone else.

After this lesson, I feel like I need more time learning...

Extension Task

Purpose: Provide an extension task for those students who are ready to deepen their understanding of rounding decimals.

1. What is the **smallest** decimal (_ . _ _) that, when rounded to the nearest tenth, rounds to 2.4? _____

   Use the number line and explain how you know you are correct.

2. What is the **greatest** decimal (_ . _ _) that, when rounded to the nearest tenth, rounds to 2.4? _____

   Use the number line and explain how you know you are correct

Discuss why the smallest decimal is 2.35, and the greatest decimal is 2.44. You may extend to using the thousandth place as an additional activity and have students compare their solutions. How did the decimals change?

Mathematical Checkpoint

Name: _____ **Date:** _____

1. Round 6.37 to the nearest tenth. _____

Explain how you know your answer is correct.

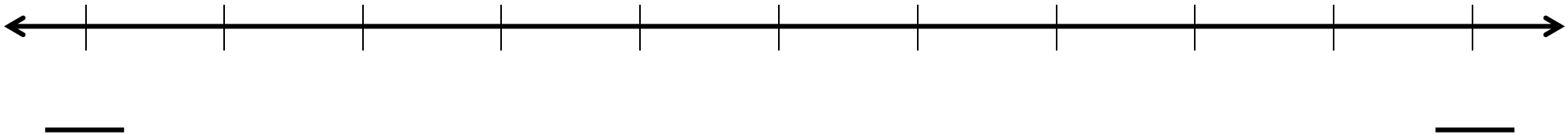
Launch - Kid's Menu
(Source: www.bubbagump.com)

Decimal Sorting Activity - Cards

1.61	1.64
1.65	1.67
1.66	1.62
1.68	1.69

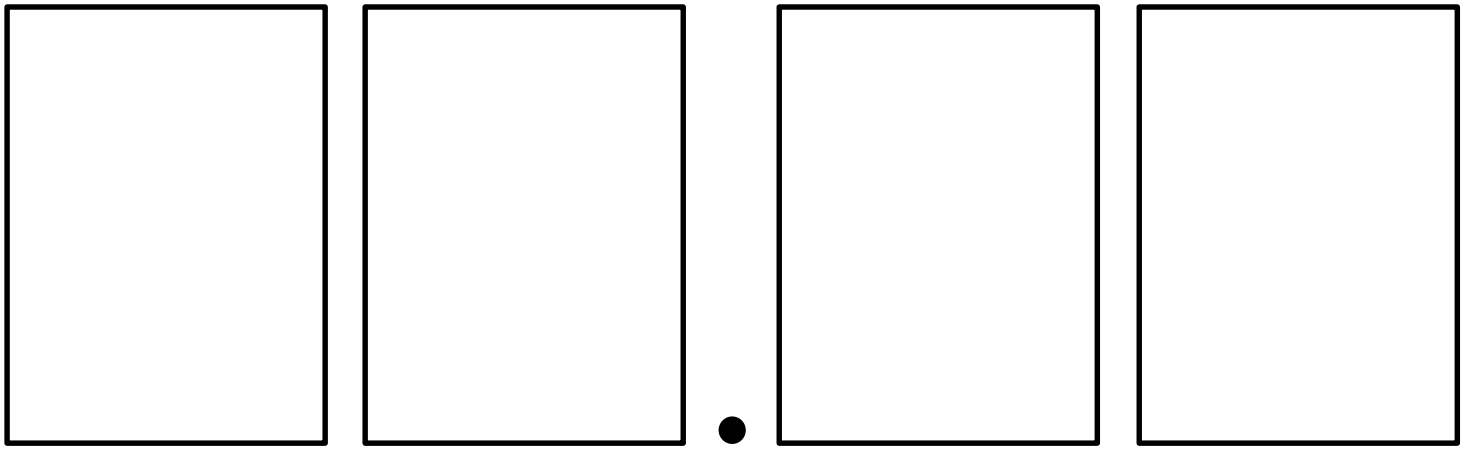
1.609	1.692

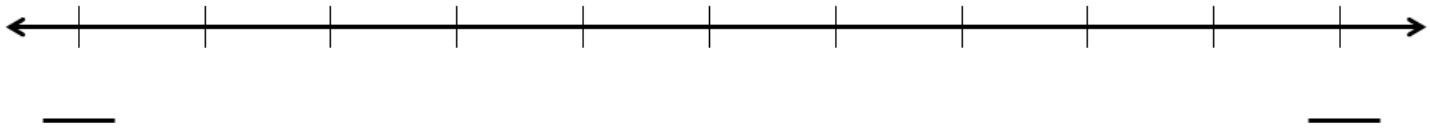
Decimal Sorting Activity - Number Line



Decimal Rounding Game

Choose a numeral card from the pile to create your decimal. You must place the numeral chosen in one of the boxes on your game board. Once a numeral is placed, you cannot change it. Continue pulling numeral cards until your decimal is complete. Once you have a complete decimal, round your decimal to the nearest tenth. Use the number line to prove your answer is correct. Compare your decimal to your partner. Whoever has the larger decimal gets 1 point. The person with the most points after nine rounds is the winner.





My decimal, _____, is between _____ and _____ .

It rounds to _____.

0	1	2	3	4
5	6	7	8	9

0	1	2	3	4
5	6	7	8	9

Decimal Rounding Game Recording Sheet

	My Decimal	Rounded to Nearest Tenth	My Partner's Decimal	Rounded to Nearest Tenth	Winner of Round
Round 1					
Round 2					
Round 3					
Round 4					
Round 5					
Round 6					
Round 7					
Round 8					
Round 9					

Equal Measures

(American to Metric)

1 mile	=	1.61	kilometers
1 yard	=	0.914	meters
1 foot	=	0.305	meters
1 inch	=	2.54	centimeters
1 gallon	=	3.79	liters
1 quart	=	0.946	liters
1 pound	=	0.454	kilograms
1 ounce	=	28.35	grams

Some of the distances, volumes, and weights in the table above have been measured to the hundredths place (1.61 kilometers) and others have been measured to the thousandth place (0.454 kilograms).
Make the measurements consistent by rounding each measurement from the table above to the nearest tenth.
Write the rounded measures in the new table below.

Equal Measures
(Rounded to Nearest Tenth)

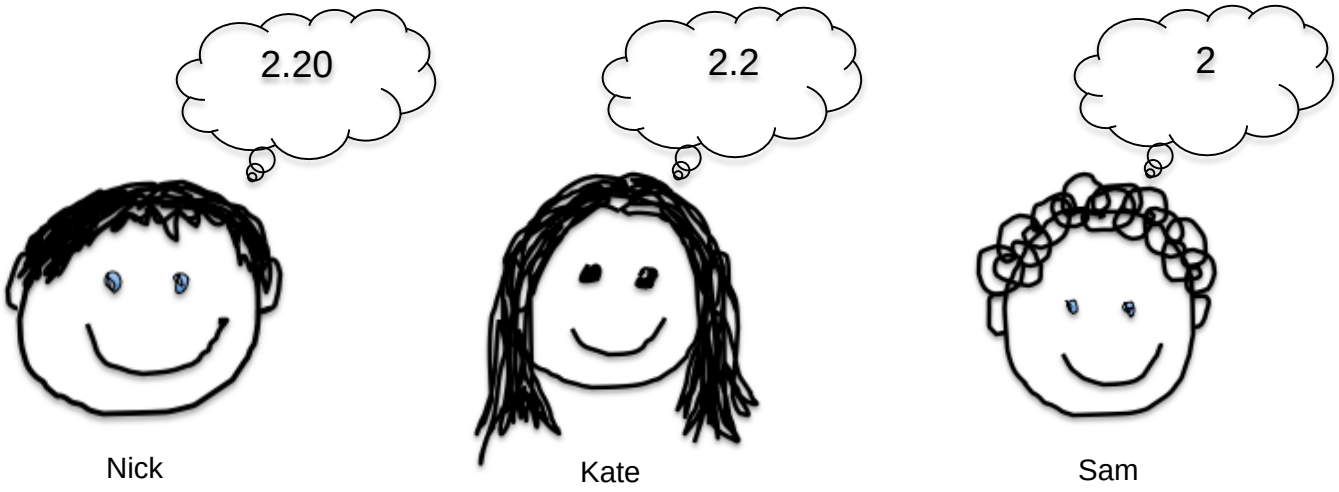
(American to Metric)

1 mile	=	kilometers
1 yard	=	meters
1 foot	=	meters
1 inch	=	centimeters
1 gallon	=	liters
1 quart	=	liters
1 pound	=	kilograms
1 ounce	=	grams

Their teacher asked the class to round 2.17 to the nearest tenth.

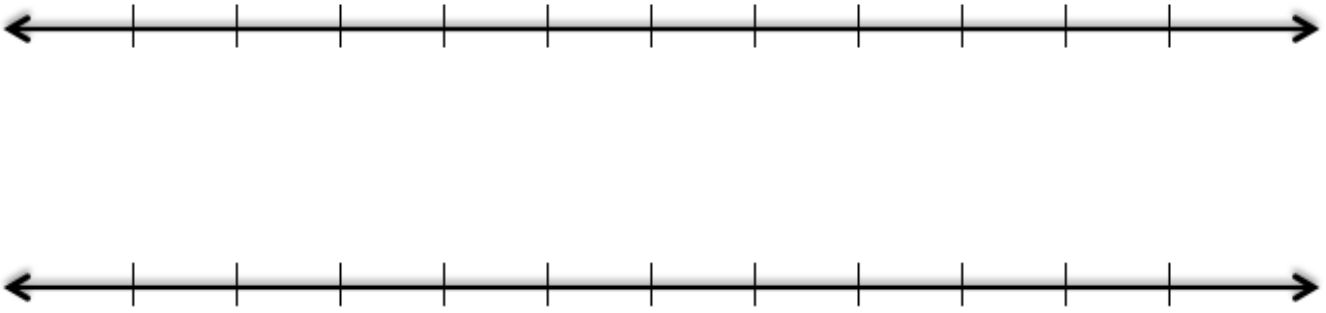
Nick thinks the answer is 2.20.
Kate thinks the answer is 2.2.
Sam thinks the answer is 2.

Which student do you agree with?
Explain why the other two students are not correct.



Check for Understanding #2

Tom's class was collecting weather data. The amount of rainfall at his school in Hartford, CT, that month was 3.84 inches. Tom said "That's about 3.8 inches." His friend Katelyn said, "No, that's about 4 inches." Their teacher said that both Tom and Katelyn were correct. Explain how this could be true. Use number lines and words to explain your reasoning.



Thinking About my Learning

Think about your learning.

Circle the statement you feel best matches your level of success with each item.

I can correctly round a decimal to the nearest tenth.	I can do this with help.	I can do this by myself.	I can do this on my own and explain it to someone else.
When I round a decimal to the nearest tenth, I can use a number line to help explain why my answer is correct.	I can do this with help.	I can do this by myself.	I can do this on my own and explain it to someone else.

EXTENSION TASK

Name: _____ Date: _____

1. Fill in the digits below to create the **smallest** decimal that, when rounded to the nearest tenth, rounds to 2.4.

____ . ___ ___ rounds to 2.4

Use the number line and explain how you know you are correct.

2. Fill in the digits below to create the **largest** decimal that, when rounded to the nearest tenth, rounds to 2.4.

____ . ___ ___ rounds to 2.4

Use the number line and explain how you know you are correct

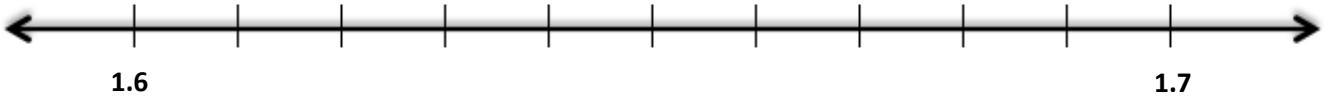
Model for Students - Part 1

Rounding to the nearest tenth means that the digit in the tenths place will be the final digit in the new rounded decimal. We use the digit in the hundredths place to help us round the decimal.

Let's use a number line to round **1.61 kilometers** to the nearest tenth.

Step One: Decide between which two tenths your decimal is located.

Your choices are the tenth just **smaller** than 1.61 or the tenth just **larger** than 1.61.
These two decimals will be the benchmark endpoints on your number line.



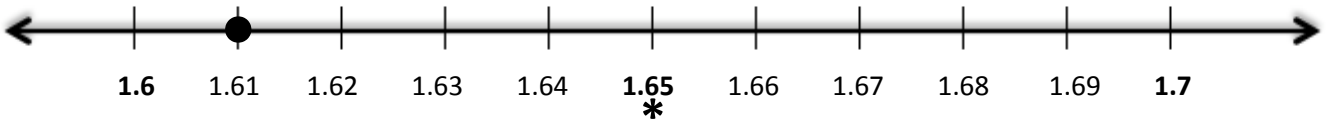
Step Two: Find the midpoint between your two endpoints.

The distance between the two endpoints is one tenth (0.1). This number line is divided into ten sections. Each increment on the number line is equal to one hundredth (0.01).

The midpoint is the decimal located halfway between 1.6 and 1.7. The midpoint is 1.65. We can see that 1.65 is 0.05 from 1.6 and 0.05 from 1.7.

*Note: The midpoint will always end with the digit 5.

Step Three: Place 1.61 on the number line.



Step Four: Compare the distance from the point, 1.61, to each endpoint. It is closer to 1.6 so we round down.

1.61 is 0.01 from 1.6 and 0.09 from 1.7.

1.61 is closer to 1.6 than to 1.7. -

1.61 rounded to the nearest tenth is 1.6.

1.61 kilometers is ABOUT 1.6 kilometers.

Your midpoint will help you decide which decimal to round to:

If the decimal you are rounding is **less** than the midpoint that means the decimal is closer to the endpoint on the left, so you will round **down**.

If the decimal you are rounding is **greater** than the midpoint, that means the decimal is closer to the endpoint on the right, so you will round **up**.

If the decimal you are rounding is **equal to** the midpoint, you will always round **up**.

Practice (Optional)

Use Worksheet #1 to have the students work in pairs to round the following decimals to the nearest tenth:

#1 2.54 centimeters
#2 3.79 liters
#3 28.35 grams

Worksheet #1

Use the number lines to round each decimal to the nearest tenth.

Label the endpoints and the midpoint. Place the decimal on the number line.

#1 2.54 centimeters

2.54 centimeters rounds to _____ centimeters.

#2 3.79 liters

3.79 liters rounds to _____ liters.

#3 28.35 grams

28.35 grams rounds to _____ grams.

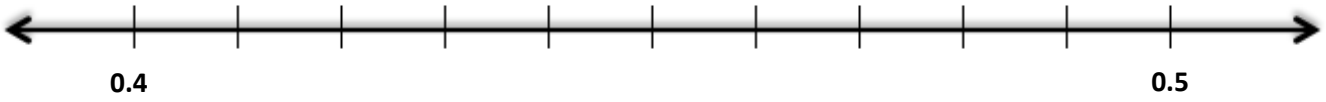
Model for Students - Part 2

Some decimals we encounter have three decimal places. To round these decimals to the nearest tenth, we still use the digit in the hundredths place to help us round the decimal.

Let's use a number line to round **0.454 kilograms** to the nearest tenth.

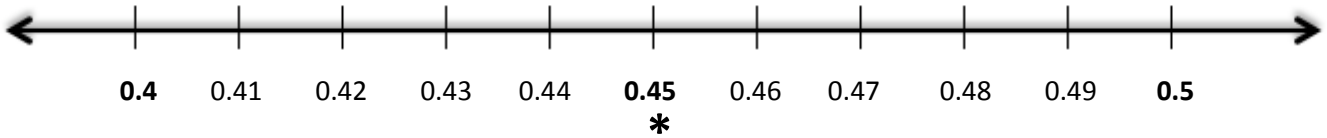
Step One: Decide between which two tenths your decimal is located.

Your choices are the tenth just **smaller** than 0.454 or the tenth just **larger** than 0.454.
These two decimals will be the benchmark endpoints on your number line.



Step Two: Find the midpoint between your two endpoints.

The distance between the two endpoints is one tenth (0.1). This number line is divided into ten sections. Each increment on the number line is equal to one hundredth (0.01).

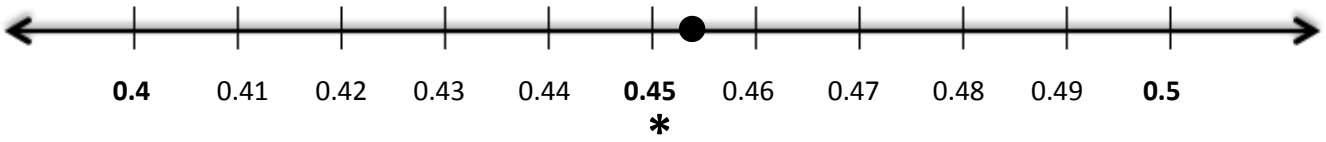


The midpoint is the decimal located halfway between 0.4 and 0.5. The midpoint is 0.45. We can see that 0.45 is 0.05 from 0.4 and 0.05 from 0.5.

Remember: The midpoint will always end with the digit 5.

Step Three: Find 0.454 on the number line.

We know that 0.454 is located between 0.45 and 0.46.



Step Four: Compare the distance from the point, 0.454, to each endpoint. It is slightly to the right of the midpoint, so we round up.

0.454 is 0.054 from 0.4 and 0.046 from 0.5

0.454 is closer to 0.5 than to 0.4.

0.454 rounded to the nearest tenth is 0.5.

0.454 kilograms is ABOUT 0.5 kilograms.

Practice (Optional)

Use Worksheet #2 to have the students work in pairs to round the following measures to the nearest tenth:

#1 0.914 meters
#2 0.305 meters
#3 0.946 liters

Worksheet #2

Use the number lines to round each decimal to the nearest tenth.
Label the endpoints and the midpoint. Place the decimal on the number line.

#1 0.914 meters

0.914 meters rounds to _____ meters.

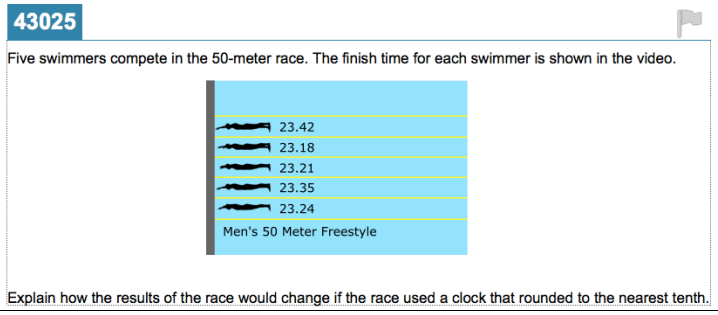
#2 0.305 meters

0.305 meters rounds to _____ meters.

#3 0.946 liters

0.946 liters rounds to _____ liters.

<table>
<tr><th colspan="2">Research and review of standard</th></tr>
<tr><th>Content Standard(s):</th><th>Standard(s) for Mathematical Practice:</th></tr>
<tr><td>Understand the place-value system
5.NBT.A.4 Use place value understanding to round decimals to any place.</td><td>MP.3 Construct viable arguments and critique the reasoning of others
○ Students explain how they used the number line and their understanding of place value, to round a decimal to any place
MP.8 Look for and express regularity in repeated reasoning
○ A student may use his/her understanding of where a decimal is placed on a number line, in relation to benchmark numbers. to deduce a rounding rule. (i.e. "If the digit to the right of the place being rounded to is 5 or greater, the decimal is rounded up. If that digit is less than 5, the decimal is rounded down")</td></tr>
<tr><th>Smarter Balanced Claim</th><th>Smarter Balanced Item</th></tr>
<tr><td>Claim 1 Concepts & Procedures
Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency

Claim 3 Communicating Reasoning
Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others</td><td>http://sampleitems.smarterbalanced.org/itempreview/sbac/index.htm
  </td></tr>
<tr><td>CPR Pre-Requisites
(Conceptual Understanding, Procedural Skills, and Representations)</td><td colspan="2">Conceptual Understanding and Knowledge
• Understand the place-value system for whole numbers and decimal fractions
• Rounding is used to replace a number with another number that is easier to work with to determine its relative value or to make a calculation easier.
• The resulting rounded number is determined by its closeness to the given number based on the place value that you are rounding to (i.e. 0.37 is closer to 0.4 than 0.3)

Procedural Skills
• Round whole numbers
• Locate benchmark numbers on a number line
• Place a decimal fraction on a number line
• Round decimal fraction to the appropriate place

Representational
• Use a model (base-ten blocks, number line) to represent a decimal fraction

Social knowledge
• Know how to write a decimal fraction
• Know how to read a decimal fraction</td></tr>
</table>

Standards Progression		
Grade(s) below	**Target grade**	**Grade(s) above**
CCSS.Math.Content.4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[2] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100*. CCSS.Math.Content.4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram*. CCSS.Math.Content.4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.	CCSS.Math.Content.5.NBT.A.3 Read, write, and compare decimals to thousandths. 5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, and explain.	CCSS.Math.Content.6.NS.B.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Common Misconceptions/Roadblocks
What characteristics of this problem may confuse students? • Students may not be able to work with more than two decimals at a time • Students may not understand the race context or know that the fastest time wins the race • Students may not know what to do if two times are the same **What are the common misconceptions and undeveloped understandings students often have about the content addressed by this item and the standard it addresses?** • Students may not understand the concept of fractional increments on the number line (i.e. tenths can be further divided into hundredths, and hundredths can be further divided into thousandths) • Students may follow a rounding "rule" without understanding the underlying place-value concepts • Students may incorrectly generalize whole number concepts to decimal fractions (i.e. thinks 0.18 > 0.6 because 18 > 6; or thinks 0.058 > 0.21 because 58 > 21; or thinks 2.04 > 2.5 because 2.04 has more digits) • Students may confuse the place value terms "tens" and "tenths"; "hundreds" and "hundredths" (i.e. thinks 0.2 < 0.02 because two "tens" is less than two "hundreds"; or rounds to the nearest "ten" instead of nearest "tenth") **What overgeneralizations may students make from previous learning leading them to make false connections or conclusions?** • Students may falsely assume that the number with more digits is always the larger number • Students add zeroes at the end of a decimal after rounding because they are overgeneralizing their work with whole numbers